

Workshop Manual Audi A6 2011 ➤ Audi A6 China 2012 ➤ Audi A7 Sportback 2011 ➤

Simos direct petrol injection and ignition system (6-cyl. 2.8 ltr. 4-valve)									
Engine ID	CHV A	ĆNY A	CNY B						

Edition 02.2012



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List of Workshop Manual Repair GroupsList of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Repair Group

24 - Mixture preparation - injection

28 - Ignition system



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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.



Contents

24 -	Mixtu	re preparation - injection	1
	1	Safety precautions and rules for cleanliness	1
	1.1	General notes on self-diagnosis	1
	1.2	Safety precautions when using testers and measuring instruments during a road test	2
	1.3	Safety precautions	2
	1.4	Safety precautions when working on vehicles with start/stop system	3
	1.5	Rules for cleanliness when working on the injection system	3
	1.6	Important: Required procedure prior to opening high-pressure injection system	4
	1.7	Checking for leaks in the fuel system	5
	1.8	Checking vacuum system	5
	2	Technical data	
			6
	3	Overview of fitting locations	7
	4	Air cleaner	17
	4.1	Air cleaner - exploded view	17
	4.2	Removing and installing air filter element	18
	4.3	Removing air cleaner housing	19
	5	Intake manifold (bottom section), fuel rail, injectors	21
	5.1	Intake manifold (top section) - exploded view	21
	5.2	Intake manifold (bottom section) with fuel rail - exploded view	23
	5.3	Removing and installing intake manifold (top section) Removing and installing intake manifold (bettom) section) with fuel railante or accept any liability. Removing and installing intake-manifold (bettom) section) with fuel railante or accept any liability. Removing and installing injectors	24
	5.4	Removing and installing intake manifold (bottom section) with fuel gailantee or accept any liability	26
	5.5	Removing and installing injections in this document. Copyright by AUDI AG.	28
	5.6	Removing and installing fuel pressure sender G247	33
	5.7	Checking fuel pressure and residual pressure (up to high-pressure pump)	34
	6	High-pressure pump	37
	6.1	High-pressure pump - exploded view	37
	6.2	Removing and installing high-pressure pipes	39
	6.3	Removing and installing high-pressure pump	39
	7	Lambda probes	44
	7.1	Lambda probes - overview	44
	7.1	Removing and installing Lambda probe G39 - bank 1 (right-side)	45
	7.2	Removing and installing Lambda probe 335 - bank 1 (right-side)	45
	1.3	Removing and installing Lambda probe after catalytic converter G130 - bank 1 (fight-side)	47
	7.4	Removing and installing Lambda probe 2 G108 before catalytic converter - bank 2 (left-	
		side)	49
	7.5	Removing and installing Lambda probe 2 after catalytic converter G131 - bank 2 (left-side)	- 4
			51
	8	Engine control unit	54
	8.1	Wiring and component check with test box V.A.G 1598/42	54
	8.2	Removing and installing engine control unit J623	56
28 -	Ianitia	on system	57
20		•	
	1	General notes and safety precautions	57
	1.1	General notes on ignition system	57
	1.2	Safety precautions when working on the injection and ignition system	57
	1.3	Safety precautions when working on vehicles with start/stop system	58
	1.4	Safety precautions when using testers and measuring instruments during a road test	58
	2	Servicing ignition system	59
	2.1	Test data	59
	2.2	Ignition system - exploded view	60
	2.3	Removing and installing ignition coils	61
	2.4	Removing and installing knock sensors	63

2.5	Removing and installing Hall senders	64
2.6	Removing and installing engine speed sender G28	65



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Mixture preparation - injection

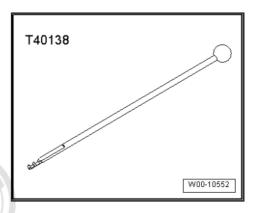
Safety precautions and rules for cleanliness

- ⇒ "1.2 Safety precautions when using testers and measuring instruments during a road test", page 2
- ⇒ "1.3 Safety precautions", page 2
- ⇒ "1.4 Safety precautions when working on vehicles with start/ stop system", page 3
- ⇒ "1.5 Rules for cleanliness when working on the injection system", page 3
- ⇒ "1.6 Important: Required procedure prior to opening highpressure injection system", page 4
- ⇒ "1.7 Checking for leaks in the fuel system", page 5
- ⇒ "1.8 Checking vacuum system", page 5

1.1 General notes on self-diagnosis

- ◆ The engine control unit has a self-diagnosis capability. Before carrying out repairs and fault finding, the event memory must be interrogated. The vacuum hoses and connections must also be checked (unmetered air).
- Fuel hoses in engine compartment must only be secured with spring-type clips. O-type clips or screw-type clips must not be used.
- A voltage of at least 11.5 V is required for proper operation of the electrical components.
- Do not use sealants containing silicone. Particles of silicone drawn into the engine will not be burnt in the engine and will damage the Lambda probe.
- The vehicles are fitted with a crash/fuel shut-off system. This system is designed to reduce the risk of a vehicle fire after a crash by deactivating the fuel pump via the fuel pump relay.
- At the same time, this system also improves the engine's starting performance. When the driver's door is opened, the fuel pump is activated for 2 seconds in order to build up pressure in the fuel system ⇒ page 2
- Use release tool -T40138- to unplug connectors that cannot be accessed easily.

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1.2 Safety precautions when using testers and measuring instruments during a road test

Note the following if testers and measuring instruments have to be used during a road test:



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Persons sitting in the front passenger's seat could be injured if the airbag is triggered in an accident.

- The use of test equipment while driving causes distraction part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability.
 There is an increased risk of injury if test equipment is not yill but by AUDI AG.
- There is an increased risk of injury if test equipment is not visecured.
- Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.

1.3 Safety precautions

To prevent injuries to persons and/or irreparable damage to the fuel injection and ignition system, the following must be noted:



WARNING

- ◆ The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4.
- A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.



Caution

- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.
- ◆ Observe notes on procedure for disconnecting the battery
 ⇒ Rep. gr. 27.

- If the battery is not disconnected, the fuse for the fuel pump control unit -J538- (located in the fuse carrier in the driver's side of the dash panel) must be removed as a precaution before opening the fuel system, because the fuel pump will otherwise be activated by the contact switch on the driver's door.
- Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as the ignition system and gas-discharge headlights.
- Do not open any fuel line connections while the engine is run-
- Always switch off the ignition before connecting or disconnecting injection or ignition system wiring or tester cables.
- If engine is to be operated at cranking speed without it starting (e.g. compression test), unplug connectors from ignition coils and remove fuse for electric fuel pump.
- Certain tests may lead to a fault being detected by the control unit and stored. The event memory should therefore be interrogated and (if necessary) erased after completing the tests and any repair work that may be required.
- Always switch off the ignition before cleaning the engine.
- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.

1.4 Safety precautions when working on vehicles with start/stop system



WARNING

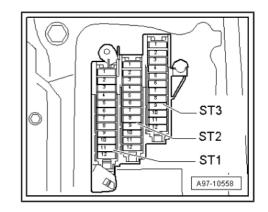
Risk of injury due to automatic engine start on vehicles with start/stop system.

- ♦ On vehicles with activated start/stop system (this is indicated by a message in the instrument cluster display), the engine may start automatically on demand.
- Therefore it is important to ensure that the start/stop system is deactivated when performing repairs (switch off ignition, if required switch on ignition again).

Rules for cleanliness when working on 1.5 the injection system

Even small amounts of dirt can cause malfunctions. When working on the fuel supply system and injection system, pay careful attention to the following basic rules:

- Carefully clean connection points and the surrounding area part or in whole, is not with engine cleaner or brake cleaner and dry thoroughly before accept any liability opening.
- Immediately seal off open lines and connections with clean plugs.
- Place parts that have been removed on a clean surface and cover them over. Do not use fluffy cloths.
- Carefully cover or seal open components if repairs cannot be carried out immediately.
- Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts



that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).

- When the system is open: Do not work with compressed air. Do not move the vehicle unless absolutely necessary.
- Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.
- 1.6 Important: Required procedure prior to opening high-pressure injection system



WARNING

The fuel system operates at extremely high pressure. This can cause injury.

- The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 7 bar).
- The fuel pressure in the high-pressure section must be reduced to a residual pressure of approx. 7 bar prior to opening the system. The procedure is described below.

Reducing fuel pressure in high-pressure section

- Connect a ⇒ Vehicle diagnostic tester.
- Start engine and run at idling speed.
- Select "Engine electronics" in vehicle self-diagnosis.
- Then select "Basic setting".
- ying for private or commercial purposes, in part or in whole. is not Select "Reducing fuel pressure in fuel rail in from the list. AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- Then select "Measured values".
- Select "Operating instructions" and "Fuel pressure" from the
- To activate basic setting, perform "Operating instructions" function.
- Observe fuel pressure displayed on ⇒ Vehicle diagnostic test-
- Fuel pressure will drop to a specified value.
- Switch off engine with pedals depressed.



WARNING

There is a risk of injury: avoid skin contact with fuel.

- Wear safety goggles and protective clothing when opening the fuel system.
- Before opening the high-pressure section of the fuel system, place a clean cloth around the connection to catch escaping fuel.
- The high-pressure system must be opened »immediately« after reducing the fuel pressure; wrap a clean cloth around the connection. Catch the escaping fuel.



Note

The pressure will increase again due to the effect of residual heat if the high-pressure system is not opened immediately.

Additional steps required

Erase event memory and generate readiness code in engine control unit in "Guided Functions" mode.

1.7 Checking for leaks in the fuel system

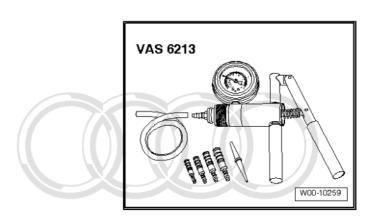
Proceed as follows:

- Allow engine to run for several minutes at moderate rpm.
- Switch off ignition.
- Check complete fuel system for leaks.
- If leaks are found although the connections have been tightened to the correct torque, the relevant component must be renewed.
- Road-test vehicle and accelerate with full throttle at least once.
- Then inspect high-pressure section again for leaks.

1.8 Checking vacuum system

Special tools and workshop equipment required

♦ Hand vacuum pump -VAS 6213-



Procedure

- Check all vacuum lines in the complete vacuum system for:
- Cracks
- Traces of animal bites
- Kinked or crushed lines
- Lines porous or leaking
- Check vacuum line to solenoid valve and from solenoid valve to corresponding component.
- If a fault is stored in the event memory, check the vacuum lines leading to the corresponding component and also check the remaining vacuum lines leading to other components.
- If it is not possible to build up a vacuum with the hand vacuum pump -VAS 6213- or if the vacuum pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.

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2 Technical data

Test data	2.8 ltr. / 4V FSI		
Idling speed Cannot be adjusted; is regulated by idling speed stabilisation	650 750 rpm ¹⁾		
Fuel pressure after high-pressure pump	40 110 bar		
Fuel pressure before high-pressure pump	3.0 8 bar		
Depending on demands placed on engine control unit.			

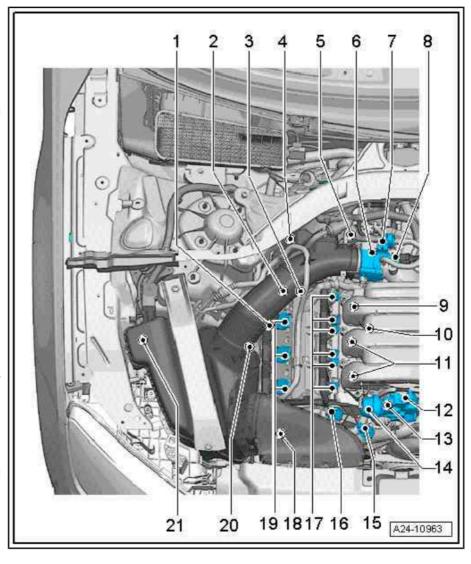


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3 Overview of fitting locations

- 1 Lambda probe -G39-
 - Fitting location ⇒ page 16
 - Fitting location of electrical connector ⇒ page 15
 - Removing and installing ⇒ page 45
 - □ 55 Nm
- 2 Exhaust camshaft control valve 1 -N318-
 - Fitting location ⇒ page 12
 - □ Renew O-ring
 - □ 2.5 Nm
- 3 Camshaft control valve 1 -N205-
 - Fitting location ⇒ page 12
 - □ Renew O-ring
 - □ 2.5 Nm
- 4 Lambda probe after catalytic converter -G130-
 - Fitting location ⇒ page 16
 - □ Fitting location of connector <u>⇒ page 15</u>
 - Removing and installing ⇒ page 47
 - □ 55 Nm
- 5 Connectors
 - For injectors, cylinder bank 1
 - ☐ For temperature sender for engine temperature regulation -G694-
 - □ For throttle valve module -J338-
 - ☐ For knock sensor 1 -G61-
 - □ For Lambda probe -G39-
 - ☐ For Lambda probe after catalytic converter -G130-
 - ☐ Fitting locations of connectors ⇒ page 15
- 6 Throttle valve module -J338-
 - ☐ Including throttle valve drive for electric throttle -G186- , throttle valve drive angle sender 1 for electric throttle -G187- and throttle valve drive angle sender 2 for electric throttle -G188-
 - After renewing, adapt throttle valve module
 - □ Fitting location ⇒ page 15
- 7 Activated charcoal filter solenoid valve 1 -N80-
- 8 Intake air temperature sender -G42- / intake manifold pressure sender -G71-
 - □ Fitting location ⇒ page 15
- 9 Injector, cylinder bank 1
 - ☐ Injector, cylinder 3 -N32-



□ Removing and installing ⇒ page 64

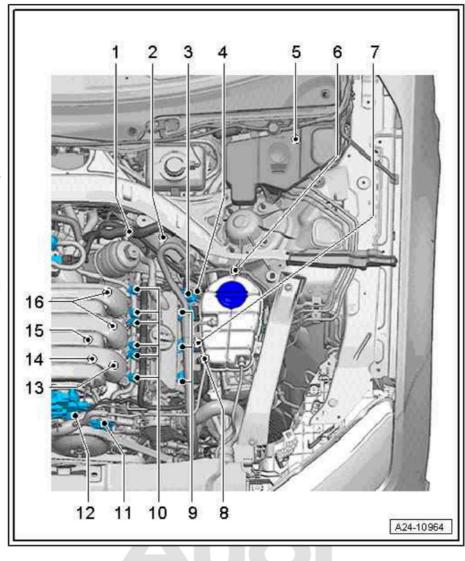
Renew O-ring

□ 9 Nm

□ Removing and installing ⇒ Rep. gr. 26

Engine compartment (left-side)

- 1 Bracket (left-side) for connectors
 - ☐ For knock sensor 2 -G66-
 - For injectors, cylinder bank 2
 - For fuel pressure sender -G247-
 - Fitting locations of connectors ⇒ page 15
- 2 Lambda probe 2 after catalytic converter -G131-
 - Fitting location ⇒ page 16
 - ☐ Fitting location of electrical connector ⇒ page 16
 - Removing and installing ⇒ page 51
 - □ 55 Nm
- 3 Camshaft control valve 2 -N208-
 - Fitting location <u>⇒ page 13</u>
 - □ Renew O-ring
 - □ 2.5 Nm
- 4 Exhaust camshaft control valve 2 -N319-
 - Fitting location ⇒ page 13
 - □ Renew O-ring
 - □ 2.5 Nm
- 5 Engine control unit -J623-
 - □ Fitting location ⇒ page 11
- 6 Lambda probe 2 -G108-
- Removing and installing ⇒ page 56
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 - □ Fitting location ⇒ page 16
 - ☐ Fitting location of electrical connector ⇒ page 16
 - □ Removing and installing ⇒ page 49
 - □ 55 Nm
- 7 Hall sender 4 -G301-
 - □ Fitting location ⇒ page 13
 - □ Renew O-ring
 - □ 9 Nm
 - □ Removing and installing ⇒ page 64
- 8 Valve for oil pressure control -N428-
 - □ Fitting location ⇒ page 14



□ Removing and installing ⇒ Rep. gr. 20

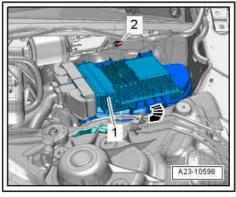
□ Fitting location ⇒ page 12

_	Don't loo	P - L 6	20.00	_ /	L L	1	24 - In	E 47	
υ	- Brake	lignt	switch	-F- /	brake	pedai	switch	-F4 <i>1</i> -	1

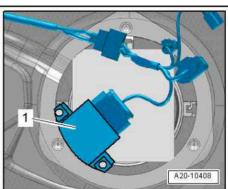
- □ In footwell on brake pedal
- □ Removing and installing ⇒ Rep. gr. 45
- ☐ Fitting location ⇒ page 12
- E Clutch position sender -G476-
 - Only fitted on vehicles with manual gearbox
 - ☐ Fitting location ⇒ page 12
- F Oil pressure switch -F22-
 - ☐ Fitting location ⇒ page 13
 - □ Removing, installing and testing ⇒ Rep. gr. 17
- G Oil pressure switch for reduced oil pressure -F378-
 - ☐ Fitting location ⇒ page 14
- H Relay and fuse holder in electronics box in plenum chamber (left-side)
 - ☐ Fitting locations ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

Fitting location of engine control unit -J623-

♦ In left electronics box in engine compartment



Fuel pump control unit -J538- -1-Removing and installing ⇒ Rep. gr. 20

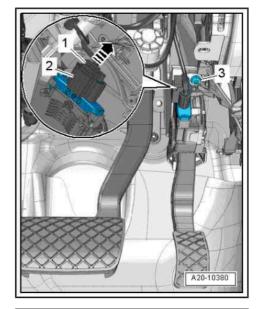




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Accelerator position sender -G79- and accelerator position sender 2 -G185-

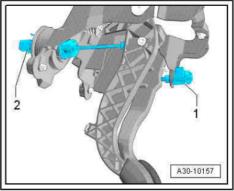
2 - Electrical connector



Clutch position sender -G476- -2-

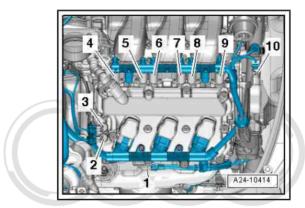
Integrated functions: clutch pedal switch for engine start -F194and clutch pedal switch -F36- (vehicles with manual gearbox only)

1 - Brake light switch -F- and brake pedal switch -F47-



Fitting location on cylinder bank 1 (right-side)

- Hall sender 3 -G300-1 -
- Exhaust camshaft control valve 1 -N318-2 -
- Camshaft control valve 1 -N205-3 -
- 4 -Actuator 6 for camshaft adjustment -F371-
- Actuator 5 for camshaft adjustment -F370-5 -
- Actuator 4 for camshaft adjustment -F369-
- 7 -Actuator 3 for camshaft adjustment -F368-
- Actuator 2 for camshaft adjustment -F367-
- Actuator 1 for camshaft adjustment -F366-
- 10 Hall sender -G40-





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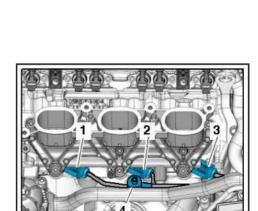
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Fitting locations on cylinder bank 2 (left-side)

- Hall sender 2 -G163-
- 2 -Actuator 7 for camshaft adjustment -F372-
- 3 Actuator 8 for camshaft adjustment -F373-
- 4 Actuator 9 for camshaft adjustment -F374-
- 5 Actuator 10 for camshaft adjustment -F375-
- 6 Actuator 11 for camshaft adjustment -F376-
- 7 Actuator 12 for camshaft adjustment -F377-
- Camshaft control valve 2 -N208-8 -
- Exhaust camshaft control valve 2 -N319-9 -
- 10 Hall sender 4 -G301-

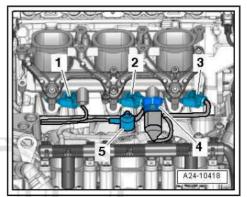
Fitting locations: components on inside of right cylinder bank 1

- Injector, cylinder 1 -N30-1 -
- 2 -Injector, cylinder 2 -N31-
- 3 -Injector, cylinder 3 -N32-
- Knock sensor 1 -G61-



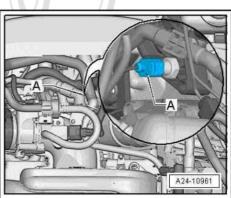
Fitting locations: components on inside of left cylinder bank 2

- 1 -Injector, cylinder 6 -N84-
- 2 -Injector, cylinder 5 -N83-
- 3 -Injector, cylinder 4 -N33-
- 4 -Fuel pressure sender -G247-
- Knock sensor 2 -G66-

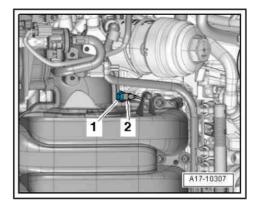


Oil pressure switch -F22- -A-

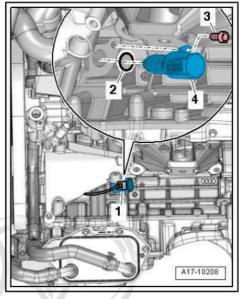
The oil pressure switch -F22- is screwed into the oil filter flange



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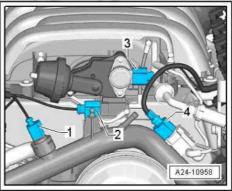
Valve for oil pressure control -N428-



Fitting location: at front of engine

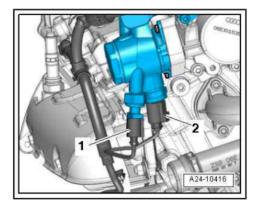
- Coolant temperature sender -G62-
- 2 -Variable intake manifold change-over valve -N156-
- 3 -Variable intake manifold position sender -G513-
- Coolant valve for cylinder head -N489-

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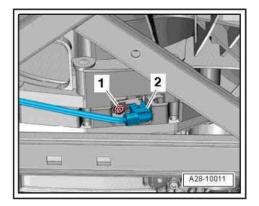
Fitting locations at high-pressure pump

- Fuel pressure sender for low pressure -G410-
- Fuel metering valve -N290-



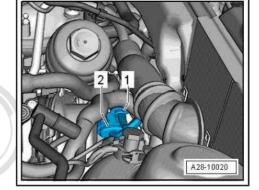
Fitting location of engine speed sender -G28-

♦ Bolted into gearbox from below



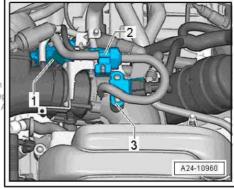
Electrical connectors

- 1 Knock sensor 2 -G66-
- 2 Injectors, cylinder bank 2, and for fuel pressure sender -G247-



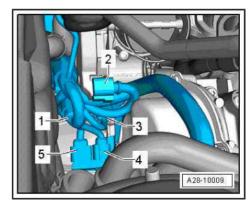
Fitting location: at rear of intake manifold

- 1 Throttle valve module -J338-
- 2 Activated charcoal filter solenoid valve 1 -N80-
- 3 Intake air temperature sender -G42- / intake manifold pressure sender -G71-Protected by copyright. Copying for private or commercial purposes, in part or in permitted unless authorised by AUDI AG. AUDI AG does not guarantee or acc with respect to the correctness of information in this document. Copyright by



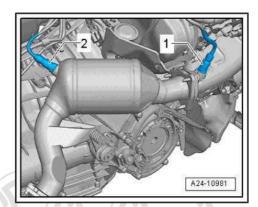
Electrical connectors on cylinder bank 1 (right-side)

- 1 Injectors, cylinder bank 1
- 2 Throttle valve module -J338- and temperature sender for engine temperature regulation -G694-
- 3 Knock sensor 1 -G61-
- 4 Lambda probe -G39-
- 5 Lambda probe after catalytic converter -G130-



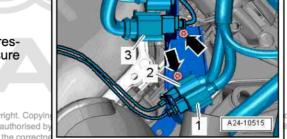
Fitting location of Lambda probes on cylinder bank 1 (right-side)

- 1 Lambda probe -G39-
- 2 Lambda probe after catalytic converter -G130-



Electrical connectors for Lambda probes on cylinder bank 2 (leftside)

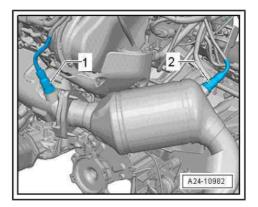
- 1 Lambda probe 2 after catalytic converter -G131-
- 2 Lambda probe 2 -G108-
- 3 Electrical connector for: injectors on cylinder bank 2, fuel pressure sender -G247-, oil pressure switch for reduced oil pressure -F378- and valve for oil pressure control -N428-
- 4 Knock sensor 2 -G66-



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Fitting location of Lambda probes on cylinder bank 2 (left-side)

- 1 Lambda probe 2 -G108-
- 2 Lambda probe 2 after catalytic converter -G131-



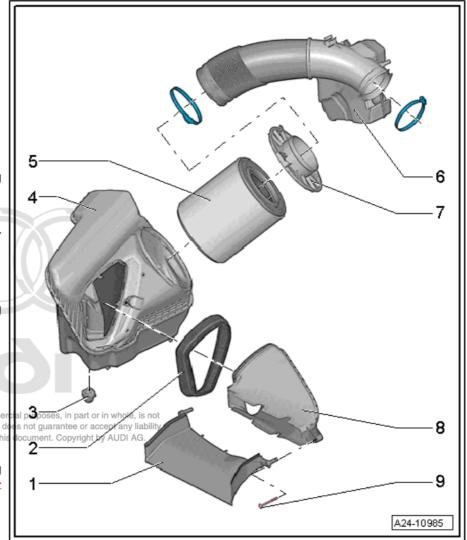
Air cleaner 4

- ♦ ⇒ "4.1 Air cleaner exploded view", page 17
- ⇒ "4.2 Removing and installing air filter element", page 18
- ♦ 3,4.3 Removing air cleaner housing", page 19

4.1 Air cleaner - exploded view

1 - Air duct

- Clean out salt deposits, dirt and leaves, etc.
- 2 Sealing element
- 3 Rubber grommet
 - For air cleaner housing
- 4 Air cleaner housing
 - Clean out salt deposits, dirt and leaves, etc.
 - Removing and installing ⇒ page 19
- 5 Air filter element
 - ☐ Use genuine air filter element ⇒ Electronic parts catalogue
 - Change intervals ⇒ Maintenance tables
 - Removing and installing ⇒ page 18
- 6 Air pipe
 - Tightening torque for hose clips ⇒ page 18
- 7 Cover
- Protected Corporair cleaner housing
 - with respect Clean routesalt deposits to and dirt
 - Removing and installing ⇒ "4.2 Removing and installing air filter element", page 18
 - 8 Air duct
 - Clean out salt deposits. dirt and leaves, etc.
 - 9 Bolt
 - □ 1.5 Nm

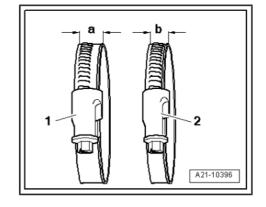


Installing air pipes and hoses with screw-type clips



Note

- Hose connections and air pipes and hoses must be free of oil and grease before assembly.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.



Tightening torque for

Hose clip -a- = 13 mm wide: 5.5 Nm

Hose clip -b- = 9 mm wide: 3.4 Nm

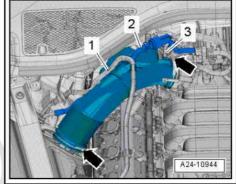
4.2 Removing and installing air filter element

Special tools and workshop equipment required

◆ Silicone-free lubricant

Removing

- Move fuel hose -1- and hose -2- leading to activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.





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- Release catch -1-, turn cover for air cleaner housing in anticlockwise direction -arrow A- and detach.
- Take out air filter element.

Installing

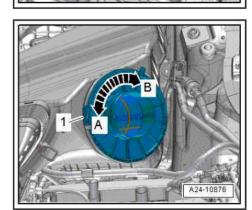
Tightening torques ⇒ "4.1 Air cleaner - exploded view", page 17



Note

- Always use genuine part for air filter element.
- The air cleaner housing MUST be clean.
- Hose connections and hoses for charge air system must be free of oil and grease before assembly.
- ♦ Use a silicone-free lubricant when installing the air hoses.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- ◆ To prevent malfunctions, cover all critical parts of the engine part or in whole, is not air intake tract (intake pipes pretc.) with a clean cloth when nee or accept any liability blowing out the air cleaner housing with compressed air. Copyright by AUDI AG.
- Observe environmental requirements for disposal.
- Clean salt residue, dirt and leaves out of air cleaner housing using a vacuum cleaner.
- Blow out water drain -arrow- on air cleaner housing with compressed air.
- Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.
- A24-10877
- When installing air filter element, check that it is properly centred in retainer in air cleaner housing.
- Carefully fit cover on air cleaner housing without using force.
- Turn cover in clockwise direction -arrow B- until catch -1- engages.
- Make sure that air hose is securely fitted on air cleaner hous-

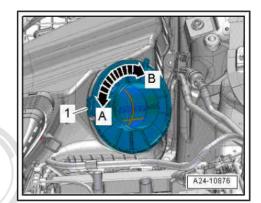
The remaining installation steps are carried out in the reverse sequence.



4.3 Removing air cleaner housing

Removing

Remove lock carrier cover ⇒ Rep. gr. 63.

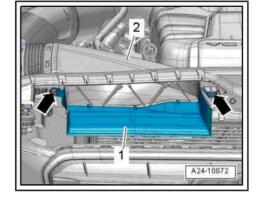


Remove bolts -arrows- and detach air duct -2-.

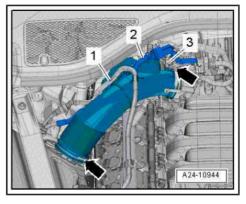


Note

Disregard -item 1-.



- Move fuel hose -1- and hose -2- leading to activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



- Lift off air cleaner housing -1-.
- Press release tabs and disconnect secondary air hose -arrow-.

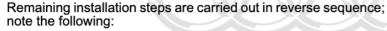
Installing

Tightening torque ⇒ "4.1 Air cleaner - exploded view", page 17

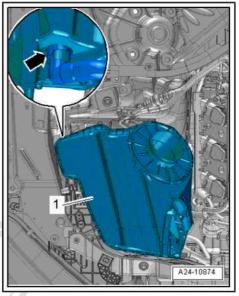


Note

- The air cleaner housing MUST be clean.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- To prevent malfunctions, cover all critical parts of the engine air intake tract (intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.



Install lock carrier cover ⇒ Rep. gr. 63.



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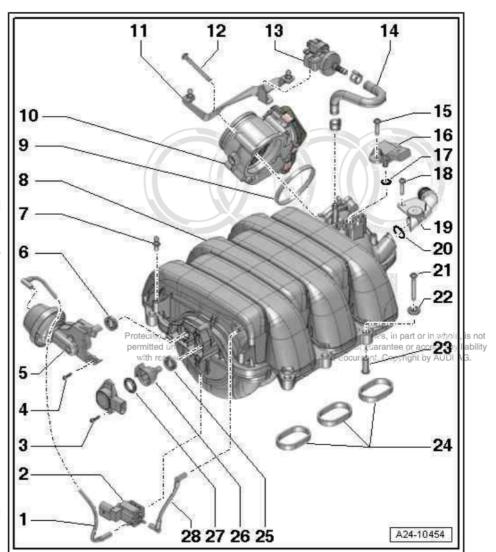


5 Intake manifold (bottom section), fuel rail, injectors

- ⇒ "5.1 Intake manifold (top section) exploded view", page 21
- ⇒ "5.2 Intake manifold (bottom section) with fuel rail exploded view", page 23
- ⇒ "5.3 Removing and installing intake manifold (top section)", page 24
- ⇒ "5.4 Removing and installing intake manifold (bottom section) with fuel rail", page 26
- ⇒ "5.5 Removing and installing injectors", page 28
- ⇒ "5.6 Removing and installing fuel pressure sender G247 ", page 33
- ⇒ "5.7 Checking fuel pressure and residual pressure (up to high-pressure pump)", page 34

5.1 Intake manifold (top section) - exploded view

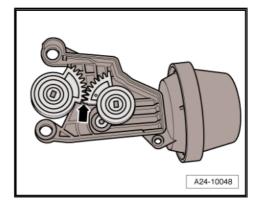
- 1 Vacuum hose
- 2 Variable intake manifold change-over valve -N156-
- 3 Bolt
 - For variable intake manifold position sender -G513-
 - □ 2.5 Nm
- 4 Bolt
 - □ 2.5 Nm
- 5 Actuator for intake manifold change-over
 - Installation position of toothed segments for intake manifold changeover ⇒ page 22
 - ☐ Replacement part is supplied together with -item 26-
- 6 Seal
 - Renew if damaged
 - When renewing lever out with screwdriver
 - Press in by hand
- 7 Ball stud
 - □ 2.5 Nm
- 8 Intake manifold (top section)
 - Removing and installing ⇒ page 24
- 9 Seal
 - Renew



10 - Throttle valve module -J338-					
11 - Bracket					
12 - Bolt					
□ 6 Nm					
13 - Activated charcoal filter soleno	id valve 1 -N	V80-			
14 - Hose					
15 - Bolt					
□ 3 Nm					
16 - Intake air temperature sender -	-G42- / intak	ce manifold	pressure s	ender -G71-	•
17 - O-ring ☐ Renew					
18 - Bolt					
□ 2.5 Nm					
19 - Crankcase breather hose					
20 - O-ring					
☐ Renew					
21 - Bolt					
□ 8 Nm					
22 - Washer					
23 - Sleeve					
24 - Gaskets					
Renew					
25 - Seal					
Renew if damagedWhen renewing lever out with	a screwdriv	er			a mant and to subside the second
☐ Press in by hand	permitted unless	authorised by AU	DI AG. AUDI AG	i does not guarant	n part or in whole, is not ee or accept any liability pyright by AUDI AG.
26 - Lever with toothed segment	Will Toopoot to				pyrigin by riobirio.
27 - Seal					
Renew if damaged					
When renewing lever out with	h screwdrive	er			
Press in by hand					

Installation position of toothed segments for intake manifold change-over

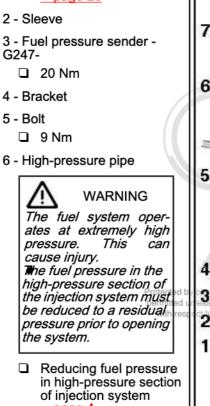
The lower edges of the toothed segments must be flush -arrow-.



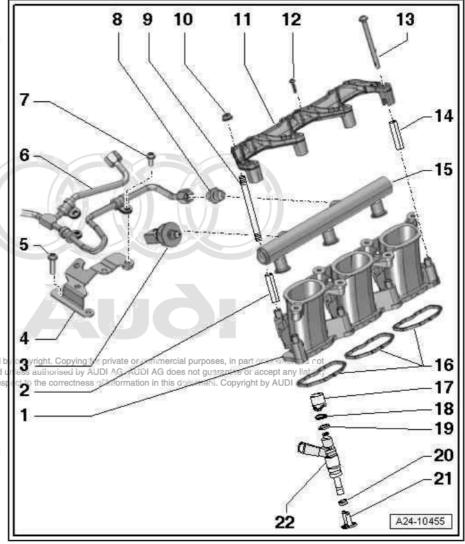
28 - Vacuum hose

5.2 Intake manifold (bottom section) with fuel rail - exploded view

- 1 Intake manifold (bottom section)
 - Removing and installing (left and right) ⇒ page 26
- 2 Sleeve
- 3 Fuel pressure sender -G247-



- ⇒ page 4
- Do not alter shape
- Do NOT bend open retainer for fuel pipe
- If retainer has been bent open or fuel pipe has to be renewed, retainer must also be renewed
- □ Tightening ⇒ page 24
- 7 Bolt
 - □ 9 Nm
- 8 Threaded connection
 - □ 40 Nm
- 9 Stud
- 10 Nut
 - □ 9 Nm
- 11 Retainer for fuel rail
- 12 Bolt
 - 2.5 Nm
- 13 Bolt
 - □ 9 Nm

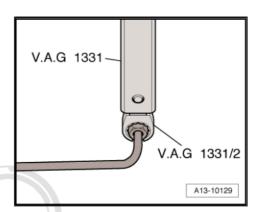


- 14 Sleeve
- 15 Fuel rail
- 16 Gaskets
 - □ Renew
- 17 Support ring
 - Make sure it is correctly seated
 - Via this support ring, the fuel rail exerts the force which holds the injector in the cylinder head.
- 18 O-ring
 - □ Renew
 - ☐ Lubricate lightly with clean engine oil
- 19 Spacer ring
 - Renew if damaged
- 20 Combustion chamber ring seal
 - Renewing ⇒ "5.5 Removing and installing injectors", page 28
- 21 Radial compensation element
 - Renew if damaged
 - ☐ Clip onto support ring -item 17-
- 22 Injector

Removing and installing ⇒ page 28

Installing high-pressure pipe

- Tighten union nut on high-pressure pipe hand-tight initially.
- Ensure that high-pressure pipe is not under tension.
- To tighten high-pressure pipe on fuel rail, use torque wrench -V.A.G 1331- with tool insert (open-end ring spanner, 17 mm) -V.A.G 1331/2- .
- Tightening torque for union nut on high-pressure pipe: 27 Nm



5.3 Removing and installing intake manifold (top section)

Removing



Note

Fit all cable ties in the original positions when installing.

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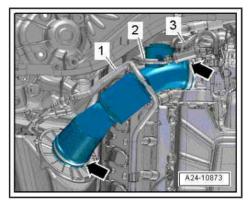
- Move fuel hose -1- and hose -2- leading to activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.

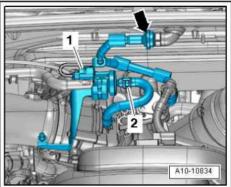




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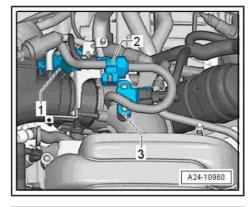


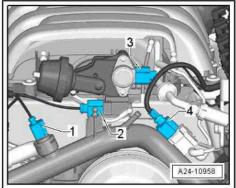
Unplug following electrical connectors:

- 1 Throttle valve module -J338-
- 2 Activated charcoal filter solenoid valve 1 -N80-
- 3 Intake air temperature sender -G42- / intake manifold pressure sender -G71-
- Detach activated charcoal filter solenoid valve 1 -N80- from bracket and move it clear to the side with hose still attached.

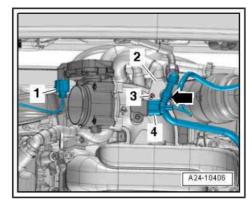


- 2 Variable intake manifold change-over valve -N156-
- 3 Variable intake manifold position sender -G513-





- Move vacuum hose clear -arrow-.
- Move electrical wiring harness clear.
- Remove bolt -3-.
- Press retaining tab -2- up slightly and detach crankcase breather hose from intake manifold.



Unscrew bolts -arrows- and remove intake manifold (top section).



Note

Seal intake ports on cylinder heads with clean cloths.

Installing

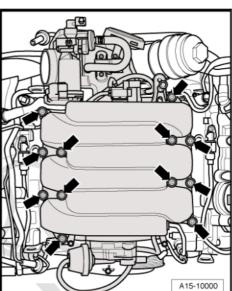
Installation is carried out in the reverse order; note the following:

Tightening torque ⇒ page 21



Note

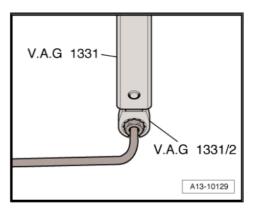
- Renew gaskets and O-rings.
- Fit all cable ties in the original positions when installing.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue.



Removing and installing intake manifold rivate or commercial purposes, in part or in whole, is not 5.4 (bottom section) with fure draits authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-
- Tool insert (open-end ring spanner, 17 mm) -V.A.G 1331/2-



Removing



Note

The following description shows the removal and installation of the bottom section of the intake manifold (left-side). The procedure for the other side is more or less identical.



WARNING

The fuel system operates at extremely high pressure. This can cause injury.

- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4.
- Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.
- Remove intake manifold (top section) ⇒ page 24.
- Unplug electrical connector at fuel pressure sender -G247--item 2-.
- Remove union nut -1-.
- Unscrew bolts and nuts -arrows- and detach intake manifold (bottom section) with fuel rail.



Note

Seal intake ports on cylinder heads with clean cloths.

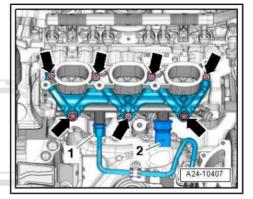
Installing

Installation is carried out in the reverse order; note the following:

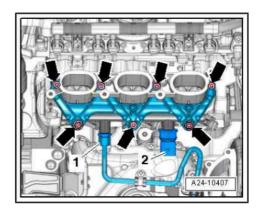


Note

- If an injector has been pulled out of the cylinder head, the teflon ring seal must be renewed a authorised by AUDI AG. AUDI AG does not guarantee or accept any liability ect to the correctness of information in this document. Copyright by AUDI AG.
- Renew gaskets and O-rings.
- Lubricate O-rings of injectors lightly with clean engine oil.
- Press intake manifold (bottom section) with fuel rail evenly onto injectors.



- Tighten bolts and nuts -arrows- for intake manifold (bottom section) in diagonal sequence and in stages.
- For tightening torque refer to exploded view of intake manifold (bottom section) with fuel rail ⇒ page 23
- Plug in electrical connector -2- at fuel pressure sender -G247-.

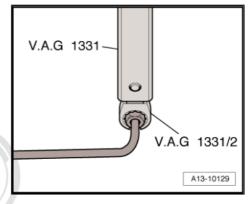


Fit high-pressure pipe -1- on fuel rail ⇒ page 39.



Note

Check fuel system for leaks.

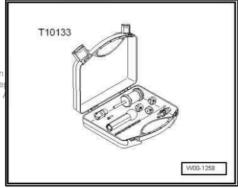


5.5 Removing and installing injectors

Special tools and workshop equipment required

◆ Tool set for FSI engines -T10133-

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Note

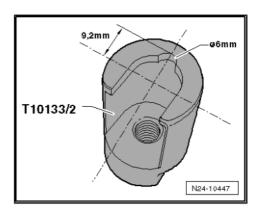
Special tool T10133/2 (puller) has been modified and now has the designation puller T10133/2 A . If you have not yet received the new tool you can make the modification yourself.

Modifying special tool T10133/2 (puller) to make it equivalent to puller T10133/2 A

Special tools and workshop equipment required

- Round file, approx. 6 mm
- File out a semi-circular recess as shown in the illustration. The recess allows the tool to be pushed further onto the injector so the contact surface is increased.

For identification purposes, mark the modified tool with the letter "A" after the tool number.



Injector - exploded view

- 1 -Injector
- 2 -Spacer ring (renew if damaged)
- 3 -O-ring (renew; apply thin coating of clean engine oil prior to installation)
- Support ring (via the support ring the fuel rail exerts force 4 which secures injector in cylinder head)
- Radial compensation element (renew if damaged) 5 -
- Combustion chamber ring seal (teflon ring seal) renew; when fitting, do not grease ring or use any other lubricant.

Removing



WARNING

The fuel system operates at extremely high pressure. This can cause injury.

- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4.
- Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.

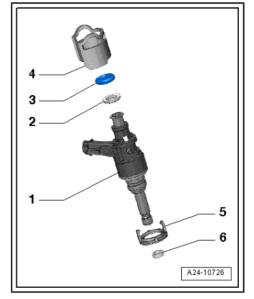
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Note

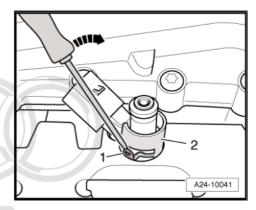
Injectors must only be installed when the engine is cold.

- Remove intake manifold (top section) ⇒ page 24.
- Remove intake manifold (bottom section) on relevant side ⇒ page 26 .



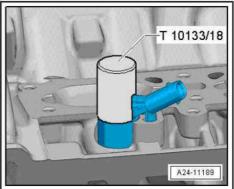
If injectors cannot be pulled out of cylinder head by hand, proceed as follows:

Use a screwdriver to bend retainer tabs -1- of radial compensation element to side -arrow- and pull support ring -2- off injector.



Slide stop sleeve -T10133/18- over injector.

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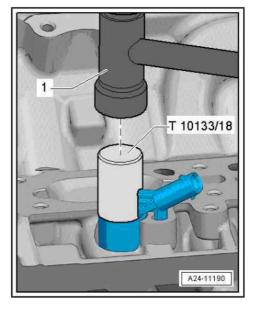


Carefully knock against stop sleeve several times to loosen injector.



Note

- Use a torque wrench to pull out injector.
- Adjust torque wrench to 5 Nm.

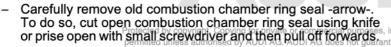


- Guide puller -T10133/2A- into groove on injector.
- Then fit guide puller T10133/16A.
- Pull out injector by turning bolt with torque wrench -1-.
- If injector does not come loose after limit torque of 5 Nm is reached, remove puller and repeat procedure using stop sleeve to loosen injector.



Note

- Observe correct torque to avoid irreparable damage to injec-
- The combustion chamber ring seal must always be renewed prior to reinstalling the injector.





Note

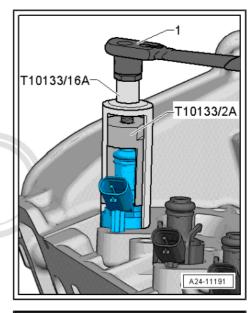
Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.

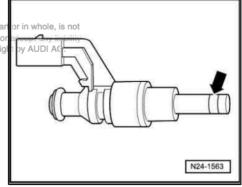
Installing

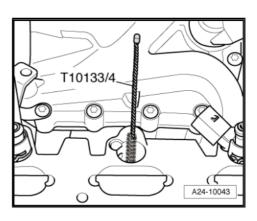


Note

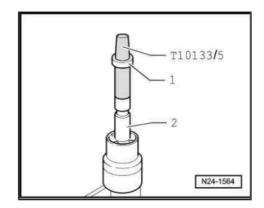
- Renew combustion chamber ring seals and O-rings.
- Renew spacer ring and radial compensation element if damaged.
- Lightly lubricate O-rings for injectors with clean engine oil.
- The injector pipes must be re-installed on the same cylinders.
- Clean bore in cylinder head with nylon cylinder brush -T10133/4- .
- When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.



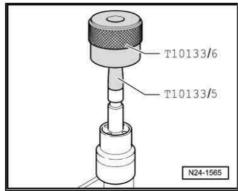




Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- from repair kit onto injector -2-.



- Using assembly sleeve -T10133/6- , push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will
- Turn round assembly sleeve -T10133/6- and slide combustion chamber ring seal into groove.

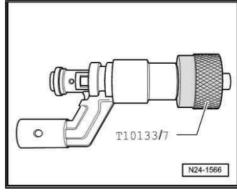


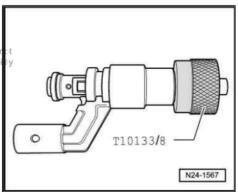


Note

The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

- Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.
- Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration, sleeve eTp10133/8atoff again;by.turning.itrin; thehole, is r opposite direction, authorised by AUDI AG. AUDI AG does not guarantee or accept any liable with respect to the correctness of information in this document. Copyright by AUDI AG.







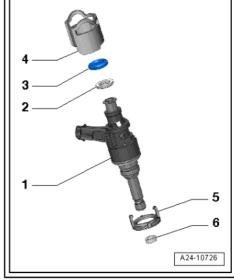
- Fit parts from repair kit onto injector -1-:
- 2 Spacer ring
- 3 O-ring
- 4 Support ring
- 5 Sealing element
- To make it easier to install injector in fuel rail, lubricate new Oring lightly with clean engine oil before installing it.



Note

The combustion chamber ring seal -6- must not be lubricated.

Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). Ensure that the injector is properly seated in the cylinder head.

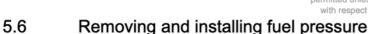




- It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.
- Note correct installation position and ensure that injectors are properly seated in cylinder head.
- If the injector cannot be pushed in by hand, use puller -T10133/2A- -2- with striker -T10133/3- to insert the injector.
- Electrical connector of injector must engage in recess in cylinder head.

Remaining installation steps are carried out in reverse sequence; note the following:

- Install intake manifold (bottom section) ⇒ page 26.
- Install intake manifold (top section) ⇒ page 24. Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Removing

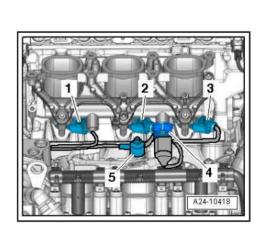
- Remove intake manifold (top section) ⇒ page 24.
- Unplug electrical connector at fuel pressure sender -G247-
- Unscrew fuel pressure sender -G247- -4-.

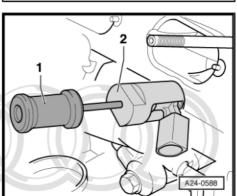
sender -G247-

Installing

Install in reverse order.

- For tightening torque refer to exploded view of intake manifold (bottom section) with fuel rail ⇒ page 23
- Install intake manifold (top section) ⇒ page 24.

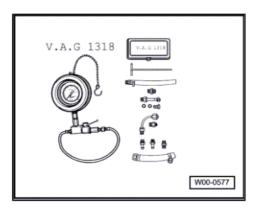




5.7 Checking fuel pressure and residual pressure (up to high-pressure pump)

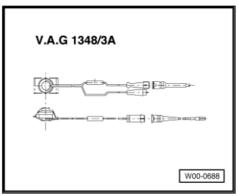
Special tools and workshop equipment required

♦ K-Jetronic pressure tester -V.A.G 1318-



- Adapter set -V.A.G 1318/10-12-
- Auxiliary measuring set -V.A.G 1594C-
- Remote control -V.A.G 1348/3A- for V.A.G 1348 with adapter cable -V.A.G 1348/3-3-





- Fuel-resistant measuring container
- Protective gloves

Checking fuel pressure

- Battery voltage at least 12.5 V.

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- Fuel tank at least 1/4 full.
- Fuel pump control unit -J538- OK.
- Ignition off.

Checking fuel pressure

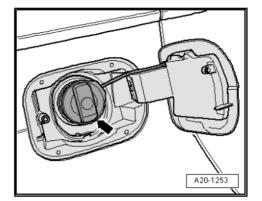
- Remove filler cap -arrow- for fuel filler neck.
- Pull off engine cover panel (front).



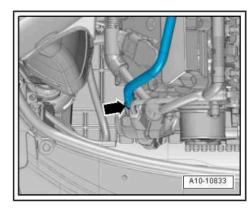
WARNING

Risk of injury - fuel system operates under high pressure.

To reduce the pressure in the fuel system, wrap a clean cloth around the connection and carefully loosen the connection.



Disconnect fuel supply line -arrow- from high-pressure pump.



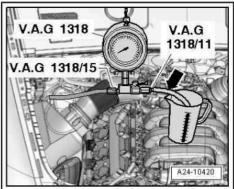
- Connect K-Jetronic pressure tester -V.A.G 1318- to fuel supply line with an adapter.
- Fit auxiliary hose -arrow- onto pressure tester and hold it in a container.



Note

Fuel system must be bled before pressure can be checked.

- Connect ⇒ Vehicle diagnostic tester.
- Select "Engine electronics" in vehicle self-diagnosis.
- Then select "Final control diagnosis".
- Select "Fuel pump electronics" from list and press "start".





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- Simos direct petrol injection and ignition system (6-cyl. 2.8 ltr. 4-valve) Edition 02.2012
- When fuel starts coming out of test hose, close cut-off valve on pressure tester.
- Lever is at right angle to direction of flow -arrow-.
- Read off fuel pressure on K-Jetronic pressure tester -V.A.G 1318- .
- Specification: 5 to 8 bar
- End this function when fuel pressure stops rising on K-Jetronic pressure tester -V.A.G 1318- .

If specification is not obtained:

Check delivery rate of fuel pump ⇒ Rep. gr. 20.

Checking residual pressure

- Check system for leaks and check residual pressure by contribut. Copying for private or commercial purposes, in part or in whole, is not provided by AUDI AG. AUDI AG does not guarantee or accept any liability ing drop in pressure on K-Jetronic pressure tester in VACG the correctness of information in this document. Copyright by AUDI AG. 1318- .
- After 10 minutes pressure should still be at least 3 bar.

If the residual pressure drops below 3.0 bar:

- Check union between pressure tester and fuel line for leaks.
- Check pressure tester for leaks.
- Check fuel lines and their connections for leaks.
- Check delivery rate of fuel pump ⇒ Rep. gr. 20.
- Renew fuel filter with integrated fuel pressure regulator ⇒ Rep. gr. 20 .
- Non-return valve of fuel pump is defective ⇒ Rep. gr. 20.

Assembly is carried out in the reverse order; note the following:

Switch off ignition.



Note

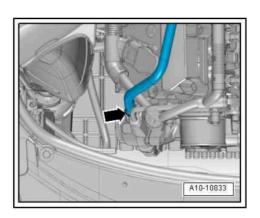
Before removing pressure tester, release fuel pressure by opening cut-off valve. Hold a container under the connection.

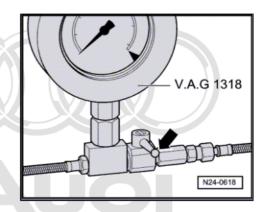
Re-connect fuel supply line -arrow- to high-pressure pump.



Note

Check fuel system for leaks.



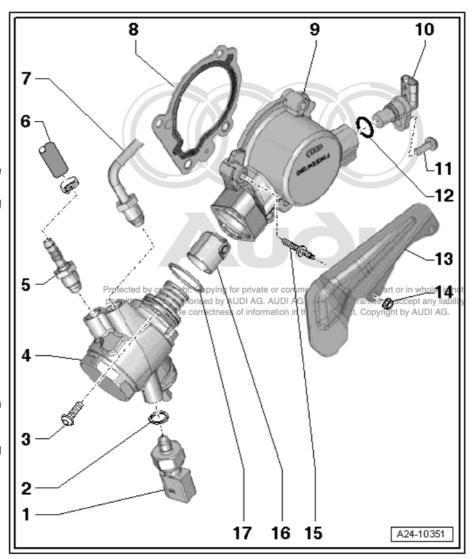


6 High-pressure pump

- ⇒ "6.1 High-pressure pump exploded view", page 37
- ⇒ "6.2 Removing and installing high-pressure pipes",
- ⇒ "6.3 Removing and installing high-pressure pump", page 39

6.1 High-pressure pump - exploded view

- 1 Fuel pressure sender for low pressure -G410-
 - □ 15 Nm
- 2 Not fitted
- 3 Bolt
 - Tightening torque and sequence ⇒ page 38
- 4 High-pressure pump
 - With fuel metering valve -N290-
 - Removing and installing ⇒ page 39
 - Do not dismantle
- 5 Threaded connection
 - Connections must not be damaged
 - □ 27 Nm
- 6 Fuel supply hose
 - Low-pressure section
- 7 High-pressure pipe
 - □ Reducing fuel pressure in high-pressure section of injection system ⇒ page 4
 - Removing and installing ⇒ page 39
 - Do not alter shape
 - Check for damage before re-installing
 - Lubricate thread of union nut with fuel
 - □ 25 Nm
- 8 Gasket
 - Renew
- 9 Housing
- 10 Hall sender -G40-
 - □ Removing and installing ⇒ page 64
- 11 Bolt
 - □ 9 Nm
- 12 O-ring
 - □ Renew

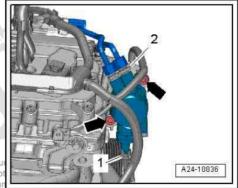


- 13 Protective plate
 - □ For high-pressure pipe
- 14 Nut
 - □ 9 Nm
- 15 Threaded pin
 - □ 9 Nm
- 16 Roller tappet
 - Can only be installed in one position
 - ☐ Lubricate lightly with clean engine oil before installing
- 17 O-ring
 - □ Renew
 - □ Lubricate lightly with clean engine oil before installing

High-pressure pump - tightening torque and sequence

Tighten bolts in 2 stages as follows:

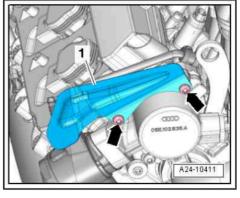
Stage	Bolts	Tightening torque
1.		Screw in bolts by hand until they make contact
2.	-arrows-	Tighten in stages; final torque 20 Nm



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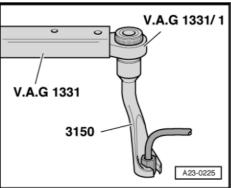
Guard plate for high-pressure pipe - tightening torque

- Tighten bolts -arrows- securing guard plate -1-.
- Tightening torque: 9 Nm



Installing high-pressure pipe

- Tighten union nut on high-pressure pipe hand-tight initially.
- Ensure that high-pressure pipe is not under tension.
- To tighten union of high-pressure pipe at high-pressure pump, use torque wrench -V.A.G 1331- with ratchet -V.A.G 1331/1and socket, 14 mm -3150-.
- Tightening torque for union nut on high-pressure pipe: 25 Nm

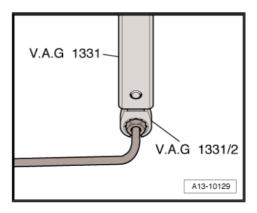




6.2 Removing and installing high-pressure pipes

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-
- ◆ Tool inserts -V.A.G 1331/2-



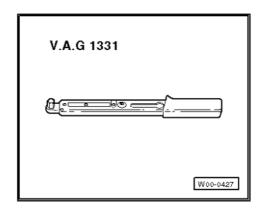


- Tighten union nut on high-pressure pump ⇒ page 38.
- The connections of the high-pressure pipes must not be dam-
- Do not bend the high-pressure pipes out of shape.
- Do NOT bend open retaining clamps for fuel pipe.
- If one of the retaining clamps has been bent open or the fuel pipe has to be renewed, the retaining clamps must also be renewed.
- Lubricate threads of union nuts with fuel.
- Hand-tighten union nuts on high-pressure pipes (ensure that pipes are not under tension).
- To tighten high-pressure pipe on fuel rail, use torque wrench -V.A.G 1331- with open-end ring spanner (tool insert -V.A.G 1331/2-).
- Tightening torque for union nut on high-pressure pipe: 25 Nm
- Do not install retaining tabs until high-pressure pipes have been tightened by copyright. Copying for private or commercial purposes, in part or in whole, is not
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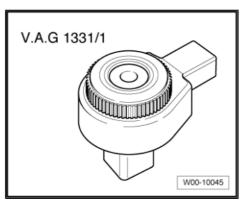
6.3 Removing and installing high-pressure pump

Special tools and workshop equipment required

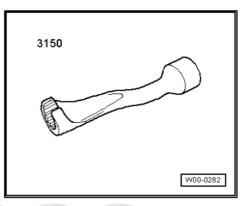
Torque wrench -V.A.G 1331-



Ratchet -V.A.G 1331/1-



Socket SW 14 -3150- or flared ring spanner tool insert AF 14 -V.A.G 1331/8-



- Wrench -T40263-
- ♦ Adapter -T40272-

Removing



WARNING

The fuel system operates at extremely high pressure. This can cause injury.

- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4.
- Wrap a clean cloth around the connection and carefully ed by loosen the connection to allow the residual pressure to rectne dissipate.

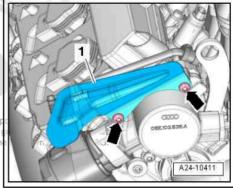
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Note

- The high-pressure pump should only be removed and installed when the engine is cold.
- When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.
- Use a cloth to catch escaping fuel.
- The O-ring must always be renewed.
- Reduce fuel pressure in high-pressure section of injection system ⇒ page 4.
- Remove air cleaner housing > page 19.
- Unscrew nuts -arrows- and remove guard plate -1-.



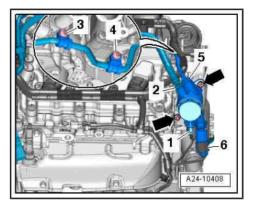
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- Unplug electrical connectors -1- and -6-.
- Remove bolts -3- and -4- from retaining clips.
- Unscrew connections -2- and -5-.
- Remove bolts -arrows-.
- Carefully pull out high-pressure pump. It is possible that the roller tappet may remain lodged inside.



Note

- Do not bend fuel pipes to a different shape.
- Do NOT bend open retaining clamps for fuel pipe.
- If one of the retaining clamps has been bent open or the fuel pipe has to be renewed, the retaining clamps must also be renewed.



Pull roller tappet -1- out of housing.

Installing

Installation is carried out in the reverse order; note the following:



Note

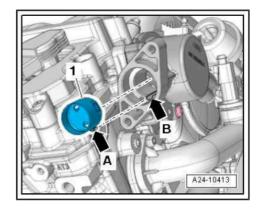
- The connections of the high-pressure pipe must not be dam-
- Do not bend fuel pipes to a different shape.
- Do NOT bend open retaining clamps for fuel pipe.
- If one of the retaining clamps has been bent open or the fuel pipe has to be renewed, the retaining clamps must also be renewed.
- Renew O-ring for high-pressure pump.
- Check roller tappet -1- for damage and renew if necessary.
- Lightly lubricate roller tappet with oil and insert it so that lug -arrow A- slides into guide notch -arrow B-.

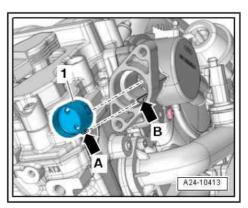


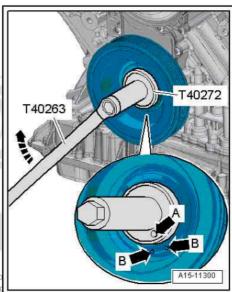
Note

The roller tappet must be positioned at the lowest point when installing the high-pressure pump.

- Fit adapter -T40272- onto wrench -T40263- .
- Position adapter on bolts of vibration damper.
- Hole -arrow A- on adapter -T40272- must be positioned between markings -arrow B- on vibration damper.
- Rotate crankshaft in direction of normal engine rotation -arrow- using wrench -T40263- and adapter -T40272-, and at the same time press roller tappet into housing until it reaches lowest point.
- Only lift high-pressure pipe slightly to fit high-pressure pump.
- Insert high-pressure pump into housing.
- Press high-pressure pump down by hand as far as possible onto stop.







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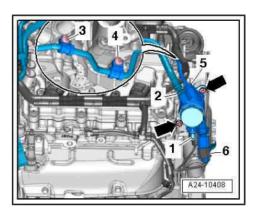
- Hand-tighten the bolts -arrows- as far as the flange.
- Then initially tighten securing bolts alternately to 5 Nm (do not tilt high-pressure pump).

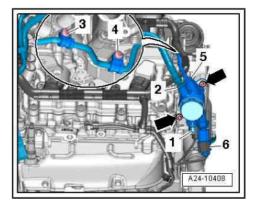


Note

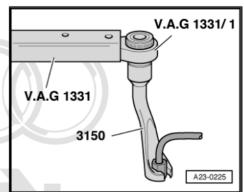
The high-pressure pump can be damaged if it is tightened too much on one side (keep it straight).

- Final tightening torque for securing bolts ⇒ "6.1 High-pressure pump - exploded view", page 37
- Tighten union nut -5- on fuel supply line hand-tight. Align so that parts are free of tension.
- Connect fuel supply hose -2- again.
- Tighten bolts -3- and -4- on retaining clips.
- Plug in electrical connectors -1- and -6-.

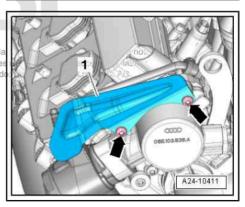




Tighten high-pressure pipe to specified torque ⇒ page 38.



- Install guard plate -1-.
- Install air cleaner housing ⇒ page 19.
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7 Lambda probes

- ⇒ "7.1 Lambda probes overview", page 44
- ⇒ "7.2 Removing and installing Lambda probe G39 bank 1 (right-side)", page 45
- ⇒ "7.3 Removing and installing Lambda probe after catalytic converter G130 - bank 1 (right-side)", page 47
- ⇒ "7.4 Removing and installing Lambda probe 2 G108 before catalytic converter - bank 2 (left-side)", page 49
- ⇒ "7.5 Removing and installing Lambda probe 2 after catalytic converter G131 - bank 2 (left-side)", page 51

7.1 Lambda probes - overview



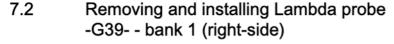
Note

- New Lambda probes are coated with an assembly paste.
- In the case of a used Lambda probe, coat only the thread with high-temperature paste; refer to ⇒ Electronic parts catalogue for high-temperature paste.
- The assembly paste / high-temperature paste must not make contact with the slots on the Lambda probe body.



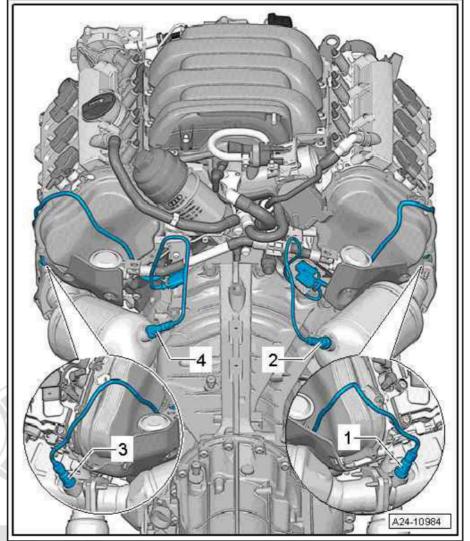
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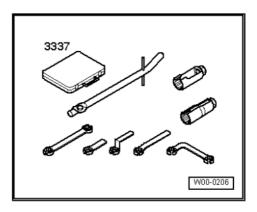
- 1 Lambda probe -G39-
 - With Lambda probe heater -Z19-
 - Removing and installing ⇒ "7.2 Removing and installing Lambda probe G39 - bank 1 (rightside)", page 45
 - □ 55 Nm
- 2 Lambda probe after catalytic converter -G130-
 - With Lambda probe 1 heater after catalytic converter -Z29-
 - Removing and installing ⇒ "7.3 Removing and installing Lambda probe after catalytic converter G130 - bank 1 (rightside)", page 47
 - □ 55 Nm
- 3 Lambda probe 2 -G108-
 - With Lambda probe heater 2 -Z28-
 - Removing and installing ⇒ "7.4 Removing and installing Lambda probe 2 G108 before catalytic converter - bank 2 (leftside)", page 49
 - □ 55 Nm
- 4 Lambda probe 2 after catalytic converter -G131-
 - With Lambda probe 2 heater after catalytic converter -Z30-
 - □ Removing and installing ⇒ page 49
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Special tools and workshop equipment required

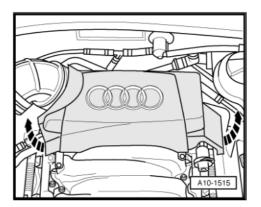
◆ Lambda probe open ring spanner set -3337-



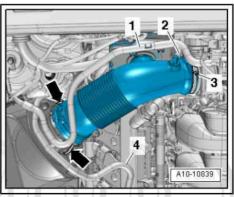


Removing

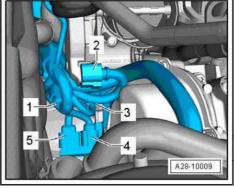
- Pull off engine cover panel (rear) -arrows-.



- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



Unplug electrical connector -4- for Lambda probe -G39-.



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Unscrew Lambda probe -G39- -1- using tool from Lambda probe open ring spanner set -3337- .



Note

For illustration purposes, the installation position is shown with the engine removed.

Installing

Installation is carried out in the reverse order; note the following:

Tightening torque: ⇒ "7.1 Lambda probes - overview", page 44



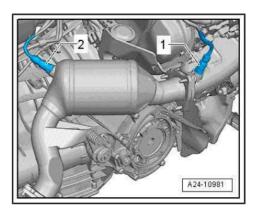
Note

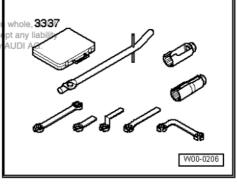
- Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe
- ♦ In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Parts catalogue
- When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.
- Fit all cable ties in the original positions when installing.
- 7.3 Removing and installing Lambda probe after catalytic converter -G130- - bank 1 (right-side)

Special tools and workshop equipment required

Lambda probe open ring spanner set -3337-

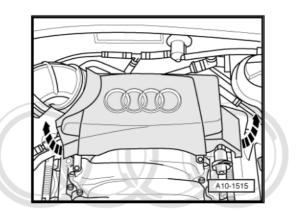
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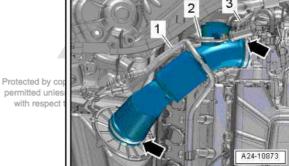


Removing

- Pull off engine cover panel (rear) -arrows-.

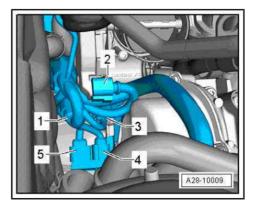


- Move fuel hose -1- and hose -2- leading to activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



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Unplug electrical connector -5- for Lambda probe after catalytic converter -G130- .





Unscrew Lambda probe after catalytic converter -G130- -2using tool from Lambda probe open ring spanner set -3337- .



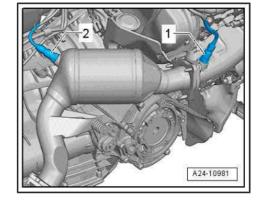
Note

For illustration purposes, the installation position is shown with the engine removed.

Installing

Installation is carried out in the reverse order; note the following:

Tightening torque: refer to overview of Lambda probes ⇒ page 44.



Note

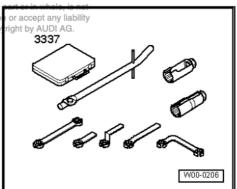
- Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe
- ♦ In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Parts catalogue
- When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.
- Fit all cable ties in the original positions when installing.

7.4 Removing and installing Lambda probe 2 -G108- before catalytic converter bank 2 (left-side)

Special tools and workshop equipment required

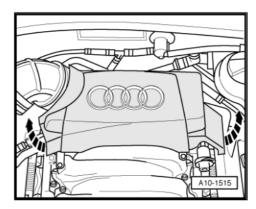
♦ Lambda probe open Protected by copyright. Copying for private or commercial purposes, i

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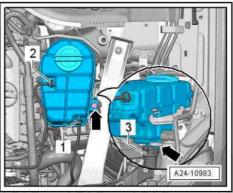


Removing

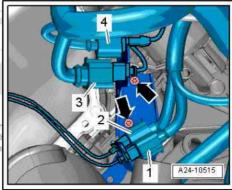
- Pull off engine cover panel (rear) -arrows-.



- Unbolt coolant expansion tank -arrows-.
- Unplug electrical connector for coolant shortage indicator switch -F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1, 2 and 3- attached.



Unplug electrical connector -2- for Lambda probe 2 -G108-.



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Unscrew Lambda probe 2 -G108- -1- using tool from Lambda probe open ring spanner set -3337- .



Note

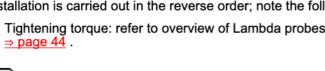
Note

For illustration purposes, the installation position is shown with the engine removed.

Installing

Installation is carried out in the reverse order; note the following:

Tightening torque: refer to overview of Lambda probes



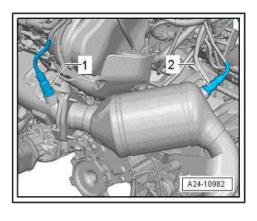
- Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe
- ♦ In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Parts catalogue
- When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.
- Fit all cable ties in the original positions when installing.
- 7.5 Removing and installing Lambda probe 2 after catalytic converter -G131-- bank 2 (left-side)

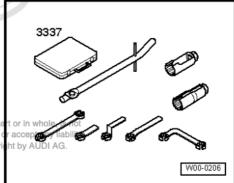
Special tools and workshop equipment required

Lambda probe open ring spanner set -3337-



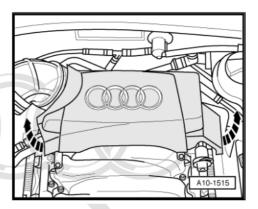
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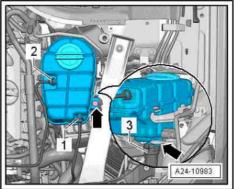
Removing

- Pull off engine cover panel (rear) -arrows-.

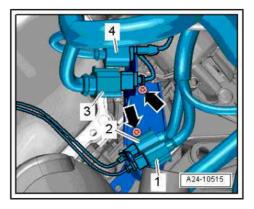


- Unbolt coolant expansion tank -arrows-.
- Unplug electrical connector for coolant shortage indicator switch -F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1, 2 and 3- attached.

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Unplug electrical connector -1- for Lambda probe 2 after catalytic converter -G131- .





Unscrew Lambda probe 2 after catalytic converter -G131--2- using tool from Lambda probe open ring spanner set -3337- .



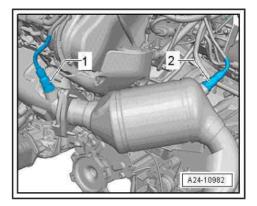
Note

For illustration purposes, the installation position is shown with the engine removed.

Installing

Installation is carried out in the reverse order; note the following:

Tightening torque: refer to overview of Lambda probes <u>⇒ page 44</u> .





Note

- Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.
- ♦ In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Parts catalogue
- When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.
- ◆ Fit all cable ties in the original positions when installing a purposes, in part or in whole, is not bes not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

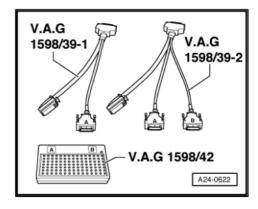
8 Engine control unit

- \Rightarrow "8.1 Wiring and component check with test box V.A.G 1598/42 ", page 54
- ⇒ "8.2 Removing and installing engine control unit J623 ", page 56

8.1 Wiring and component check with test box -V.A.G 1598/42-

Special tools and workshop equipment required

- Adapter cable -V.A.G 1598/39-1-
- Adapter cable -V.A.G 1598/39-2-
- Test box -V.A.G 1598/42-



⇒ Vehicle diagnostic tester



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Note

- The test box -V.A.G 1598/42- has 105 sockets. It can be connected to the engine control unit via 2 different adapter cables.
- The engine control unit is connected to the vehicle's wiring harness via two connectors, one of which has 60 pins, the other has 94 pins.
- To carry out tests on the 60-pin wiring harness connector, the adapter cable -V.A.G 1598/39-1- is connected to connector -A- on the test box. For components connected to 60-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- To carry out tests on the 94-pin wiring harness connector, the adapter cable -V.A.G 1598/39-2- must be connected to connectors -A- and -B- on the test box. For components connected to 94-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- The test box -V.A.G 1598/42- is designed so it can be connected both to the wiring harness for the engine control unit and to the engine control unit itself at the same time. The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).
- Always use auxiliary measuring set -V.A.G 1527B- to connect test equipment (e.g. voltage tester -V.A.G 1526E-, hand-held multimeter -V.A.G 1594C- etc.). Protected by copyright. Copying for

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Caution

Electronic components are susceptible to damage.

- Select the appropriate measuring range before connecting the test leads and observe test requirements.
- Remove engine control unit -J623- ⇒ page 56.
- Connect test box -V.A.G 1598/42- to wiring harness connector. The earth clip on the test box must be connected to the negative battery terminal. The instructions for performing the individual tests indicate whether or not the engine control unit -J623- itself also needs to be connected to the test box.
- Carry out test as described in appropriate repair procedures.

Installing engine control unit

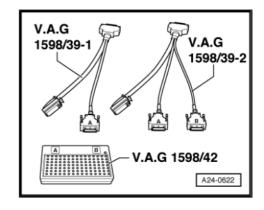
Installation is performed in the reverse sequence.

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions.



Note

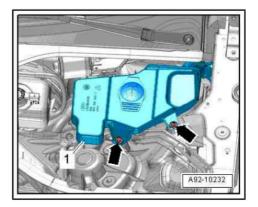
After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining faults registered in the memories must be rectified until all fault entries can be erased.



8.2 Removing and installing engine control unit -J623-

Removing

- When renewing engine control unit, select diagnosis object "Replace engine control unit" in "Guided Functions" mode of ⇒ Vehicle diagnostic tester.
- Switch off ignition and remove ignition key.
- Remove plenum chamber cover ⇒ Rep. gr. 50.
- Unscrew bolts -arrows- and pull filler neck out of washer fluid reservoir and through opening in body to right side.



Release catch -arrow- and detach engine control unit -J623--item 1-.



Note

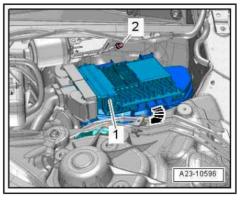
Disregard -item 2-.

Installing

Installation is performed in the reverse sequence.

After installing a new engine control unit, the following operation must be performed:

Activate engine control unit using ⇒ Vehicle diagnostic tester in "Guided Functions" mode, "Replace engine control unit".





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Ignition system

General notes and safety precau-1

- ⇒ "1.4 Safety precautions when using testers and measuring instruments during a road test", page 58
- ⇒ "1.3 Safety precautions when working on vehicles with start/ stop system", page 58
- ⇒ "1.4 Safety precautions when using testers and measuring instruments during a road test", page 58

1.1 General notes on ignition system

- The engine control unit has a self-diagnosis capability.
- A voltage of at least 11.5 V is required for proper operation of the electrical components.
- Certain tests may lead to entries being stored in the event memory of the engine control unit. The event memory must be interrogated after completing all tests and repair work.
- If the engine starts, runs for a short period and then cuts out after completing fault finding, repairs or component tests, this may be due to the immobilizer disabling the engine control unit. The event memory of the engine control unit must then be interrogated and, if necessary, the control unit must be adapted.

1.2 Safety precautions when working on the injection and ignition system

To prevent injuries to persons and/or damage to the fuel injection and ignition system, note the following:

- Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as the ignition system and xenon headlights.
- Do not touch or disconnect ignition wiring when the engine is running or being turned at starter speed.
- Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- Always switch off ignition before washing engine.
- If you want to crank the engine at starting speed without actually starting the engine (e.g. compression test), first unplug the electrical connectors from the ignition coils ⇒ page 61.
- Also remove fuse for fuel pump control unit J538-→ Current flow diagrams, Electrical fault finding and Fitting locations. AG.
- Entries will be stored in the event memory of the engine control unit if electrical connectors have been unplugged and the engine started.





Caution

To prevent irreparable damage to the electronic components when disconnecting the battery:

- Observe notes on procedure for disconnecting the battery.
- Always switch off the ignition before disconnecting the battery.
- Disconnect battery ⇒ Electrical system; Rep. gr. 27.
- 1.3 Safety precautions when working on vehicles with start/stop system



WARNING

Risk of injury due to automatic engine start on vehicles with start/stop system.

- On vehicles with activated start/stop system (this is indivated cated by a message in the instrument cluster display), the engine may start automatically on demand.
- Therefore it is important to ensure that the start/stop system is deactivated when performing repairs (switch off ignition, if required switch on ignition again).

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1.4 Safety precautions when using testers and measuring instruments during a road test

Note the following if testers and measuring instruments have to be used during a road test:



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Persons sitting in the front passenger's seat could be injured if the airbag is triggered in an accident.

- The use of test equipment while driving causes distraction.
- There is an increased risk of injury if test equipment is not secured.
- Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.



2 Servicing ignition system

- ♦ ⇒ "2.1 Test data", page 59
- ♦ "2.2 Ignition system exploded view", page 60
- ◆ ⇒ "2.3 Removing and installing ignition coils", page 61
- ♦ 3.4 Removing and installing knock sensors, page 63
- ♦ 3,2.5 Removing and installing Hall senders", page 64
- ◆ ⇒ "2.6 Removing and installing engine speed sender G28 ", page 65

Test data 2.1

Engine data		2.8 ltr. / 4V FSI
Idling speed		Cannot be adjusted; regulated by idling speed stabilisation
Ignition timing		Not adjustable (determined by control unit)
Ignition system		Multi-coil system with 6 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Spark plugs	Designations	⇒ Data sheets for exhaust emissions test
	Removing and installing Tightening torque	⇒ Maintenance ; Booklet 411
Firing order		1-4-3-6-2-5

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2.2 Ignition system - exploded view



□ 9 Nm

2 - Hall sender

- ☐ Cylinder bank 1 (rightside)
- Inlet side: Hall sender -G40-
- Exhaust side: Hall sender 3 -G300-
- Removing and installing Hall senders ⇒ page 64

3 - O-ring

□ Renew

4 - Knock sensor

- Contact surfaces between knock sensor and cylinder block must be free of corrosion, oil and grease.
- Cylinder bank 1 (rightside): knock sensor 1 -G61-
- ☐ Cylinder bank 2 (leftside): knock sensor 2 -G66-
- Removing and installing ⇒ page 63

5 - Bolt

□ 25 Nm

6 - Spark plug

- □ Change interval ⇒ Maintenance tables
- □ Remove and install with spark plug socket and extension -3122 B- ⇒ Maintenance; Booklet 411
- □ 30 Nm

7 - Ignition coil

- ☐ Ignition coil 1 with output stage -N70-
- ☐ Ignition coil 2 with output stage -N127-
- ☐ Ignition coil 3 with output stage -N291-
- ☐ Ignition coil 4 with output stage -N292-
- ☐ Ignition coil 5 with output stage -N323-
- ☐ Ignition coil 6 with output stage -N324-
- □ Removing and installing ⇒ page 61
- Use puller -T40039- for removal

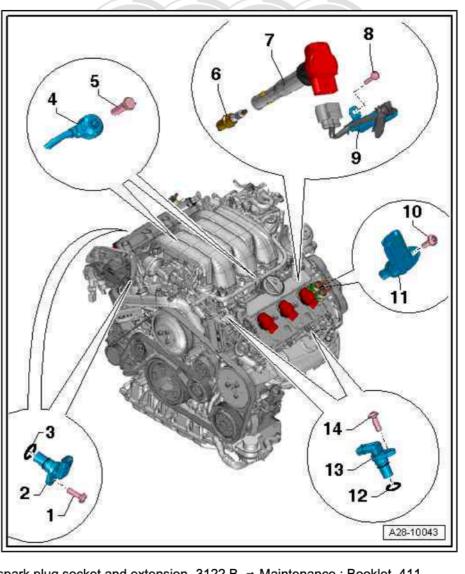
8 - Bolt

□ 5 Nm

9 - Electrical wiring harness

10 - Bolt

□ 9 Nm



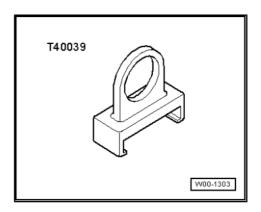
- 11 Engine speed sender -G28-
 - □ Removing and installing ⇒ page 65
- 12 O-ring
 - □ Renew
- 13 Hall sender
 - ☐ Cylinder bank 2 (left-side)
 - ☐ Inlet side: Hall sender 2 -G163-
 - ☐ Exhaust side: Hall sender 4 -G301-
 - ☐ Removing and installing Hall senders ⇒ page 64
- 14 Bolt
 - □ 9 Nm

2.3 Removing and installing ignition coils

Special tools and workshop equipment required

♦ Puller -T40039-





Removing ignition coils on cylinder bank 1:

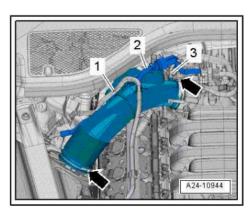
- Move fuel line -1- and line -2- leading to activated charcoal filter clear on air cleaner housing and air pipe.
- Prote Detach vacuum hose -3- from connection on air pipe, is not
- permitted unless authorised by AUDI AG. AUDI AG does not quarantee or accept any liability with each hose clips of arrows and remove ally pipe AUDI AG.

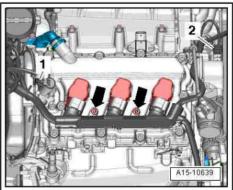
- Remove bolts -arrows- and unplug electrical connectors at ignition coils.
- Move electrical wiring harness down slightly.



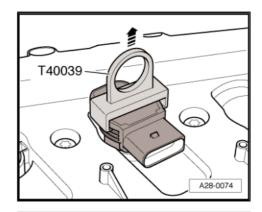
Note

Disregard -items 1, 2-.

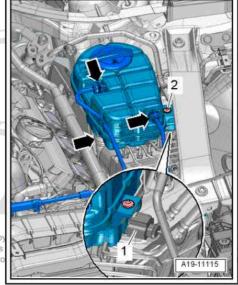




Pull ignition coils out of spark plug holes using puller -T40039-. Removing ignition coils on cylinder bank 2:



- Unplug electrical connector -1-.
- Remove bolt -2-.
- Move coolant expansion tank to side (coolant hoses -arrowsremain connected).



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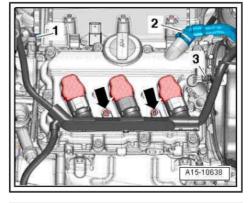
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- Remove bolts -arrows- and unplug electrical connectors at ignition coils.
- Move electrical wiring harness down slightly.



Note

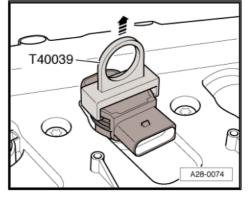
Disregard -items 1, 2, 3-.



- Pull ignition coils out of spark plug holes using puller -T40039-. Installing
- Fit all ignition coils loosely into spark plug holes.
- Align the ignition coils with the connectors and attach all connectors onto ignition coils simultaneously.
- Press ignition coils onto spark plugs by hand evenly (do NOT use tool).

The remaining installation steps are carried out in the reverse sequence.

Tightening torque for electrical wiring guide for ignition coils to cylinder head cover: 5 Nm





2.4 Removing and installing knock sensors

Electrical connectors

- 1 To injectors on cylinder bank 1
- 2 Throttle valve module -J338-
- 3 Knock sensor 1 -G61-
- 4 Lambda probe -G39-
- 5 Lambda probe after catalytic converter -G130-

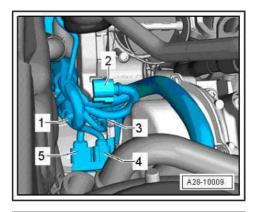
Electrical connectors

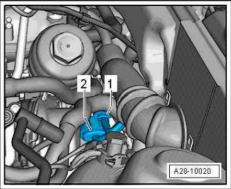
- 1 Knock sensor 2 -G66-
- 2 Injectors, cylinder bank 2, and for fuel pressure sender -G247-

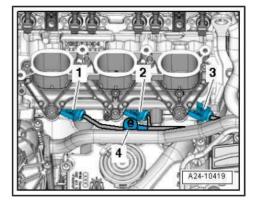
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4 - Knock sensor 1 -G61-







Knock sensor for cylinder bank (left-side)

5 - Knock sensor 2 -G66-

Removina



WARNING

- The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4.
- A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.
- Observe notes on procedure for disconnecting the battery ⇒ Rep. gr. 27.



Remove relevant intake manifold (bottom section) with fuel rail ⇒ page 26 .



Note

To reach the bolt on knock sensor 1 -G61- -4- you must first remove injector 2. To reach the bolt on knock sensor 2 -G66- -4you must first remove injector 5.

Remove bolt from corresponding knock sensor.

Installing

Re-install whichever knock sensor was removed.



Note

The tightening torque influences the function of the knock sensor.

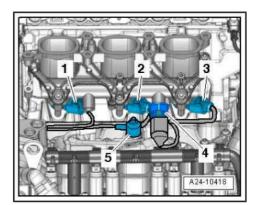
- Tightening torque: refer to exploded view of ignition system ⇒ page 60 .
- Install relevant intake manifold (bottom section) with fuel rail
- Install intake manifold ⇒ page 24.

Removing and installing analises enders AUDI AG does not guarantee or accept any liability 2.5 mation in this document. Copyright by AUDI AG.

Fitting locations of the four Hall senders: refer to Fitting locations overview ⇒ page 7.

Removing

- Unplug electrical connector from corresponding Hall sender.
- To remove Hall sender 3 -G300- on cylinder bank 1 you must first remove the air cleaner housing ⇒ "4.3 Removing air cleaner housing", page 19.
- To remove Hall sender 4 -G301- on cylinder bank 2 you must first remove the coolant expansion tank.



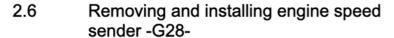


- Unplug electrical connector -1-.
- Remove bolt -2-.
- Move coolant expansion tank to side (coolant hoses -arrowsremain connected).

Installing

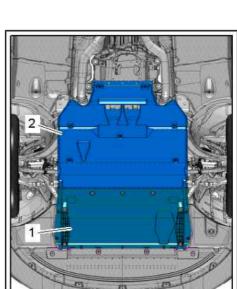
- Renew O-ring and lubricate with clean engine oil.
- Carefully press in Hall sender by hand.
- Secure Hall sender and plug back connector.
- The remaining installation steps are carried out in the reverse sequence.
- Tightening torque: ⇒ "2.2 Ignition system - exploded view", page 60

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Removing

Remove rear noise insulation panel -2- ⇒ Rep. gr. 66.

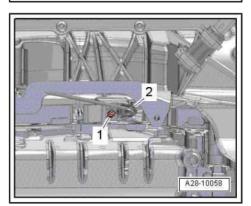


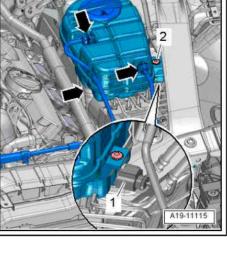
- Unplug electrical connector -2-.
- Unscrew bolt -1- and remove engine speed sender -G28-.

Installing

Install in reverse order.

- Tightening torque: ⇒ "3 Overview of fitting locations", page 7
- Install noise insulation ⇒ Rep. gr. 66.





A10-11234